TACKLING POLLUTION IN URBAN RIVERS:

A GUIDE TO RUNNING AN OUTFALL SAFARI

JUNE 2025

ZSL

ACKNOWLEDGEMENTS

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Supported by

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Catchment Based Approach

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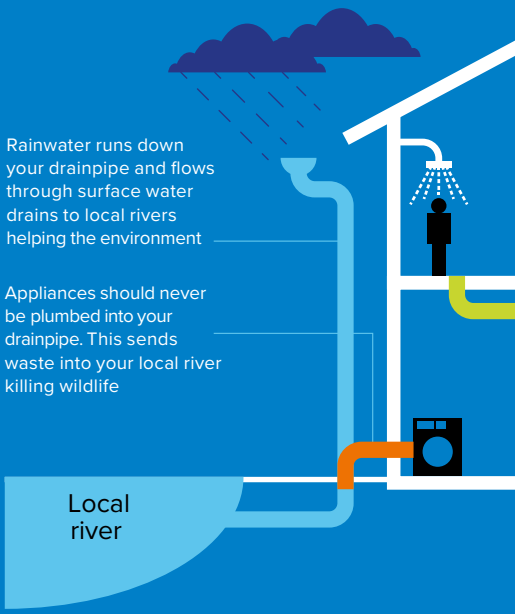
BACKGROUND

Introduction

One of the major threats to the water quality of rivers that flow through urban areas is pollution entering from surface water outfalls. When there are cross overs between the foul and the surface water system, the point of discharge from the surface water sewer, the outfall, will become polluted and termed a Polluted Surface Water Outfall (PSWO). Cross overs between the foul and surface water system can be caused by misconnections, blockages or failing and/or badly designed assets. All result in pollution entering rivers via the surface water drainage system and compromise the biodiversity and amenity value of our waterways.

The Outfall Safari was first created by the Citizen Crane project steering group (Crane Valley Partnership, Environment Agency Thames Water, Friends of the River Crane Environment (FORCE), Frog Environmental and ZSL) and used on the River Crane in May 2016. Since then, the method has been used systematically in Greater London where every river is surveyed on a four-year rotation and the approach has been adopted by other UK-based environmental Non-Governmental Organisations (NGOs). The outfall assessment used in Outfall Safari is based upon guidance developed by Water UK and the Environment Agency. To support the expansion of the Outfall Safari method, the CaSTCo programme has funded the updating of the original guidance to assist organisations who wish to set up an Outfall Safari in their local area.



QUICK GUIDE

What?

Surface water outfalls are the discharge point of pipes that convey rainfall run-off into rivers. However, outfalls can also be a source of chronic pollution in urban rivers when wastewater makes its way into the surface water system, bypassing the wastewater treatment process. Outfall Safari is a systematic method to survey outfalls for pollution that is being discharged into the river.

Why?

Polluted surface water outfalls (PSWOs) can reduce dissolved oxygen and increase ammonia and phosphate concentration, which can damage the natural environment. The earlier PSWOs are reported to the water company and the regulator, the sooner they can be investigated, and the pollution stopped.

Who?

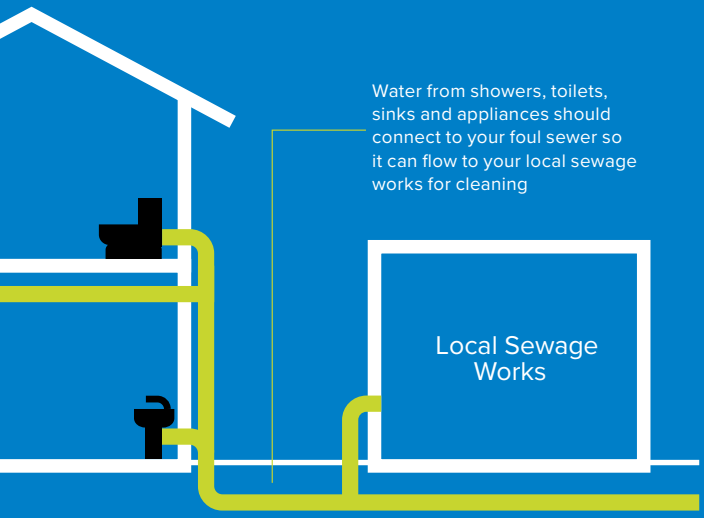
An Outfall Safari is a partnership project that ideally involves the regulator, the water company, a host environmental NGO, the Catchment Partnership and volunteer citizen scientists.

Where?

The Outfall Safari survey method can be used anywhere there is a dual drainage system i.e. separate surface water and foul water drainage systems.

How?

In dry weather only, trained volunteers walk the riverbanks with a mobile app that allows them to geolocate, photograph and assess outfalls for evidence of pollution. The survey is coordinated by the lead partner, who follows the volunteer surveys with in-channel surveys through sections of the catchment that volunteers can't access. Data are sent directly to a database for analysis and reporting to the regulator and water company for follow on action to remove sources of pollution.



BACKGROUND

What are polluted surface water outfalls and why are they a problem?

Pollutants move from land to rivers by a variety of different pathways. One significant pathway is via the surface water drainage network. For those urban areas which are served by two drainage networks, one set of pipes conveys foul waste to a sewage treatment works and the other sends surface water (rainfall run-off) to the nearest river via an outfall. These surface water outfalls are visible discharge points that are generally more than 20cm in diameter. PSWOs are different to Combined Sewer Overflows (CSOs), in that CSOs are permitted to temporarily discharge untreated sewage into waterways when the sewerage system is at risk of becoming overwhelmed, such as during heavy downpours, or when there are sewer blockages or equipment failures. This is regulated by the Environment Agency under The Environmental Permitting (England and Wales) Regulations 2016.

The following are the principal ways that surface water outfalls become polluting.

Misconnections

When household appliances and washing facilities (e.g., washing machines, dishwashers and toilets) are incorrectly plumbed in, or 'misconnected' into the surface water drains, their wastewater ends up in rivers via outfalls. Misconnections to the surface sewers scale between single domestic appliances to whole blocks of flats.

Blockages

Blockages in the foul sewers, caused for example by a build-up of fat or wet wipes, can also pollute rivers by causing foul wastewater to back up in the sewers and drain into the surface water network and then to rivers.

Failing or poorly designed assets

Pollution incidents can arise from poorly designed or failing assets such as chamber defects, cracks, collapsed walls or missing rodding eye caps allowing foul water to cross over into the surface water system. Many causes of pollution are due to infrastructure issues such as dual manholes. Dual manholes allow shared access to both foul and surface water sewers that are sometimes in open channels. They can result in cross contamination of both foul to surface water and surface water to foul.

Surface Water Drain Abuse

All surface water drains lead to rivers in areas of separate drainage. For example, car and bin washing on the street means that chemicals in any cleaning products used runs directly into the nearest waterway via the surface water drainage network. Lack of public awareness or indifference means the compound effect of multiple inputs in cities damages rivers.

Surface water drains move rainfall run-off to the river via outfalls

Where misconnections, blockages and infrastructure failures exist, pollution enters our waterways

THE AIMS OF THE OUTFALL SAFARI ARE:

To **record** and **map** the dry weather condition of surface water outfalls in rivers.

To **assess** and **rank** the impact of the outfalls and **report** those that are polluting to the regulator (e.g., Environment Agency in England), water company (e.g., Thames Water) and Catchment Partnership.

To **build** evidence on the scale of the PSWO problem and **drive** an increase in investment to resolve it.

To **engage communities** with their local rivers and inspire change.

How can we measure the scale of the polluted outfall problem?

In urban areas, asset failure, blockages, cross and misconnections are lumped together as diffuse pollution. The contribution of these issues to the overall pollution load in rivers is poorly evidenced – systematic surveys of urban rivers, using Outfall Safari, across the UK will support a more evidenced understanding of their impact.

The organisation and completion of an Outfall Safari involves the following steps:

1. Identify the catchment that will be surveyed and involve key partners (the Catchment Partnership, regulator, the relevant water company, and other environmental NGOs and community groups that could support the project).
2. Advertise the project, recruit volunteers and host an Outfall Safari training session in the local area.
3. Setup a means by which the volunteers and host NGO can communicate throughout the Outfall Safari so that survey locations and dates can be agreed. For example, Padlet or WhatsApp. This will avoid stretches of river being missed or surveyed twice.
4. Support volunteers to carry out the surveys from the bankside – only when the weather has been dry for 48 hours. The data inputted via Cartographer is sent to a database for checking and analysis by the host NGO. More information on the project app, Cartographer, can be found on page 23. Inaccessible sections of bankside can be surveyed in-channel by the host NGO, regulator and/or water company.
5. Where the water company is a partner, NGO prepare a report of the Outfall Safari for the regulator and water company, the format of which should be agreed beforehand to suit the water company and regulator's requirements. Share the findings of the Outfall Safari with Catchment Partnership stakeholders and the volunteers.

BACKGROUND

What are the limitations of the Outfall Safari?

Before any Outfall Safari starts, all volunteers should attend a training session that covers information on what PSWOs are and instruction on how to assess each outfall using the project app. However, there are still elements of subjectivity in the assessment process that are difficult to entirely eliminate. This may lead to some inconsistencies, however, major discrepancies can be avoided through:

1. clear training at the outset;
2. quality control of the data as it is submitted; and
3. ongoing communication between volunteers and the host NGO throughout the Outfall Safari.

Each outfall should be assessed just once over the course of an Outfall Safari, and an entire catchment will likely be surveyed within a two-month period, depending on the weather. The Outfall Safari results therefore represent a snapshot in time – an audit of how outfalls, within the study area, were behaving during the survey. Those outfalls that only pollute intermittently therefore may not be detected as a problem at the time of the survey and could be causing more serious problems than the impact scores suggest. The Outfall Safari method therefore has the potential to underestimate the scale of the PSWO problem. Similarly, the time at which an outfall is assessed could affect the impact seen. For example, if a school is the source of a misconnection issue, but the outfall is assessed over the school holiday period, then the pollution that is discharged to the river during term time could be missed.

Lastly, areas of very overgrown vegetation can obscure views of outfalls or prevent access to parts of the riverside. In this situation, staff from the host NGO and/or the regulator may be able to lead an in-channel survey of the section where riverside access is restricted. However, if the vegetation is overgrown to such an extent that it obscures the entirety of the banks then it is still possible that outfalls could be missed and the scale of the PSWO problem be underestimated. To avoid this, those sections of the river could be re-visited at a later date when the vegetation has died back (winter months) or in the initial stages of spring re-growth.

The Outfall Safari method is designed as a snapshot, dry weather survey and works well in urban areas to assess pollution from PSWOs. Although in some instances this method can help to identify pollution from other sources such as combined sewer overflows and road run-off, as it is a dry weather survey, its main aim is to identify the issue of polluted surface water outfalls. This survey method was developed for urban areas where there is a separate drainage system. If the method is used in more rural areas, there will be other considerations such as agricultural run-off and septic tanks.

Within London, outfalls are surveyed on a 4-year rotation to cover every river in London and to give the water company time to trace and remove sources of pollution before re-surveying. For more regular monitoring of known problem outfalls, some organisations have developed ‘adopting an outfall’ schemes or pollution patrols that encompass regular checks of outfalls. Data generated by these schemes in addition to Outfall Safari surveys can help in evidencing the overall impact of outfalls in your catchment.

FOR MORE REGULAR MONITORING OF KNOWN PROBLEM OUTFALLS, SOME ORGANISATIONS HAVE DEVELOPED ‘ADOPTING AN OUTFALL’ SCHEMES OR POLLUTION PATROLS THAT ENCOMPASS REGULAR CHECKS OF OUTFALLS

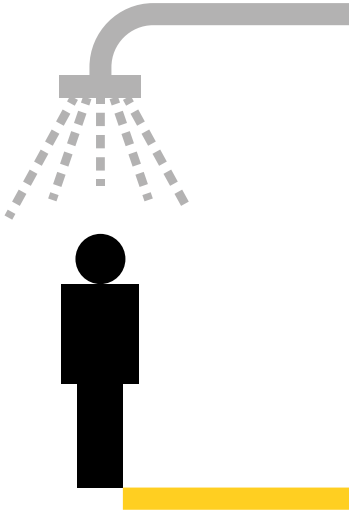
OTHER CITIZEN SCIENCE METHODS

Other methodologies that include monitoring to detect pollution entering rivers include:

- **Riverfly:** Riverfly Monitoring Initiative (RMI): involves volunteers monitoring invertebrate populations in rivers and streams to detect pollution events. The RMI is the most widely used river-based citizen science scheme in the UK. More information is available from the Riverfly Partnership who devised the method.

- **Water quality testing** of key parameters such as phosphate, ammonia, conductivity and biological oxygen demand. There is a wide range of equipment available, but reliable snapshot results can be obtained by citizen scientists using colorimetric test kits such as Hanna checkers, but for a more detailed picture of the timing of pollution events it may be necessary to deploy a continuous monitoring sonde, a piece of equipment used to monitor water quality in situ.

In-channel surveys allow investigation of very rarely visited sections of river



RUNNING AN OUTFALL SAFARI SURVEY

Timings

The timeline involved in organising and running an Outfall Safari for the host NGO is shown opposite. It outlines when to recruit, train, and carry out surveys to avoid overgrowth of vegetation that prevents surveys, with plenty of time for volunteers to complete their allocated sections. The time it takes to set up and run an Outfall Safari may vary. For example, if it is the first Outfall Safari, contacts need to be established, the team coordinator has to be set up on the **Cartographer** app, and the report template needs to be created.

When timing an Outfall Safari, it is important to remember that dry weather is a survey requirement. Rain and high-water levels can wash away evidence of pollution and mask background misconnection issues. Surface water outfalls are designed to convey rainfall into the watercourse, so, in periods of higher-than-normal rainfall, this larger volume of water can wash away signs of pollution such as sewage fungus and rag, and dilute the discolouration often associated with pollution. Therefore, 48 hours of no rain in the catchment is needed to conduct any survey work. It is suggested that two months are set aside to complete a survey to allow for delays due to weather.

The time required will also change depending on the area of the catchment that needs to be surveyed.

Training

Once the catchment has been identified and partnerships are established, the volunteer recruitment can begin, and the training dates arranged. Partnership with other environmental NGOs and/or Catchment Partnership hosts that may have an existing pool of enthusiastic citizen scientists can help with volunteer recruitment.

Volunteers interested in taking part in an Outfall Safari should attend a training session delivered by the host NGO and if possible, the water company and regulator. The training session should include:

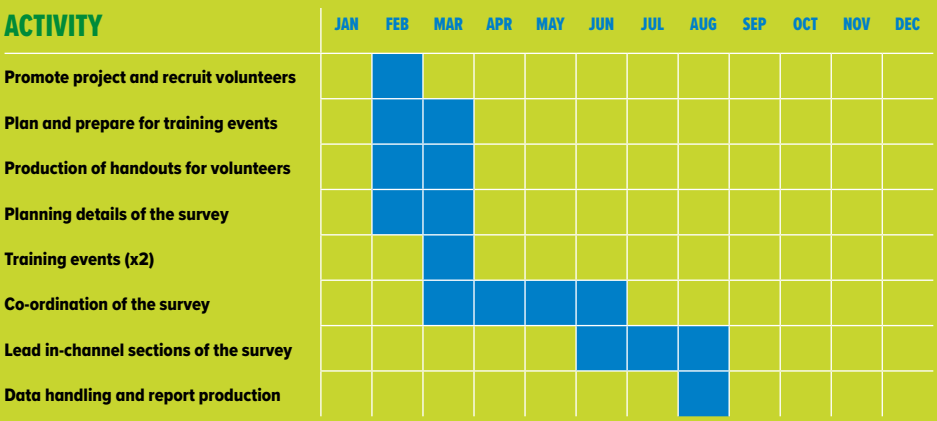
- an overview of water quality issues in the catchment;
- information on surface water outfalls and how they become polluted;
- information on the local water company and how they address PSWOs;
- instruction on how to assess each outfall using the project app and how to upload information to the database; and
- a health and safety briefing and signing of the risk assessment.

During training, volunteers can be assigned lengths of the river to survey and timescales agreed. Each section of river should be assigned a surveyor, who will be the key contact for the host NGO. It should be the surveyor's responsibility to report back to the host NGO if any stretches of the river were inaccessible and require an in-channel survey. It is important that this process is established to avoid sections of river being missed or surveyed twice.

The host NGO should ensure that volunteers are aware of the likely timescales for misconnections to be resolved. The expectation should be that serious issues will see immediate action, and others will inform long term work programmes.

Volunteers should also be made aware of the wildlife that could be present in, next to or near the rivers that will be surveyed and how they can avoid causing disturbance and/or harm. For example, care must be taken to avoid impacts on any breeding birds and their nests.

OUTFALL SAFARI TIMELINE



Health and safety considerations

For volunteers, all the survey work can and should be safely conducted from the riverside path. Where parts of the riverbank are inaccessible, they should be marked as so in the app and re-visited by a staff member during in-channel surveys. In channel surveys are led by the host NGO, water company and/or regulator. Waders, stabilising poles and lifejackets should be used by in-channel survey teams.

Dry weather

48 hours of no rain in the catchment is essential for conducting any Outfall Safari survey work.

Too much surface water will:

- **Mask background misconnection issues; and**
- **Wash away evidence of pollution such as sewage fungus.**

All survey teams (bankside and in-channel) should have appropriate personal protective equipment (PPE) for the site at which they are working (such as sturdy footwear) and be cautious on the riverbank where there is a risk of trips, slips and falls. Volunteers should be advised not to touch the outfalls, regardless of whether signs of pollution are visible or not. All survey teams should also carry with them the volunteer handout to help with ranking the impacts of each outfall, a smart phone or tablet loaded with the project app for data entry and at least one fully charged mobile phone in case of emergency. Long trousers are recommended in case of brambles and/or stinging nettles.

Additional health and safety risks that volunteers should be made aware:

- **Giant hogweed *(Heracleum Mantegazzianum)*:** an invasive non-native species that contains a toxic sap that can result in severe burns and contact with the plant must be avoided. Volunteers should be shown images of giant hogweed so that they are able to identify it.

RUNNING AN OUTFALL SAFARI SURVEY

- **Weil's Disease:** an infection (also known as leptospirosis) which can be caused by contact with contaminated water. Volunteers should be made aware of the potential risks, the precautions that they can take (cover up cuts and abrasions for example) and that if concerned and showing signs of infection, to contact their doctor.
- **Safeguarding:** volunteers should be advised to carry out bankside surveys in pairs. If sending out volunteers to survey together who have met during the training session, safeguarding must be considered. In the Thames region, as long as one individual is trained, a volunteer is able to complete the survey with a friend or family member to avoid lone working.
- **Private land:** Volunteers should be told to not enter private land and to mark it as inaccessible. If possible, these sections should be visited by the NGO at a later date once permission has been obtained from the landowner.

The above and any other site-specific hazards should be assessed in a risk assessment that is made available for survey participants to read and sign during the training session.

General CaSTCo health and safety guidance can be found here: https://castco.org/knowledge-base/health-and-safety-guidance/

After the training

Groups of volunteers are free to conduct the survey of their reach when convenient to them, within the survey period, provided the weather has been dry. A means by which the volunteers and host NGO can communicate should be setup to help with further coordination of survey dates and reaches. Some flexibility is required as rain can often interfere with survey dates and it is important to the management and motivation of volunteers that the host NGO is easily contactable. A Padlet page works well for this, which is a free online digital noticeboard that can only be viewed and posted on by those with the link. Volunteers can be invited to join the closed group after the training. The page provides a forum for the host NGO to monitor progress (ensuring that there is no overlap in survey area or missed sections), for volunteers to arrange the details of surveys, and for any questions or issues that crop up to be shared. Other options include a closed Facebook group or Whatsapp, but the benefit of Padlet is that there is no requirement to share personal information such as phone numbers or profiles amongst volunteers.

GENERAL CASTCO HEALTH AND SAFETY GUIDANCE CAN BE FOUND HERE:

https://castco.org/knowledge-base/health-and-safety-guidance/

DATA CAPTURE, PROCESSING AND SHARING

Outfall assessment method

For each outfall, whether it is polluted or not, an assessment form should be completed in the project app, Cartographer (further details on this is available in later sections of the guide). The app allows for remote data collection and upload (on GPS-enabled smart phones or tablets) and a web portal to access and download the data.

It is important that volunteers complete only one assessment form per outfall. Multiple assessment forms will need to be removed from the dataset by the host NGO before analysis (more information on data management is available in later sections of the guide).

The assessment form (on the project app) contains 15 questions (see Table 2) and was developed collaboratively with Thames Water and the Environment Agency (based on Good Practice Document – Investigation and rectification of drainage misconnections, by Water UK and Environment Agency, 2009, freely available online). The answers are then converted into an overall impact score. In the Thames region, Thames Water now provide a unique reference code for each known Thames Water outfall so that we can better track pollution history of individual outfalls and measure success. Volunteers are asked to report the reference number of the outfall they are surveying. Known Thames Water outfalls are displayed in the cartographer map on the survey form.

In the case of Greater London, it was agreed with Thames Water that this threshold for reporting a PSWO directly from the river is a score of 10. More detail on this reporting procedure is provided on page 20.

Once the assessment form is complete, it must be stored before the next form is started. The Cartographer app will ask whether the volunteer wants to save the entry as a draft or to upload the entry for approval by an administrator. Once the entry has been saved and uploaded, administrators can view and check the data and then approve it, which results in the data entry being displayed on the Cartographer map. Once approved, the volunteer will receive an email notification that their data has been approved and uploaded.

Volunteer surveys are conducted from the bankside

In difficult to access areas, in-channel work may be required, led by the NGO, regulator and/or water company. Lifejackets, waders and stabilising poles are required safety equipment

DATA CAPTURE, PROCESSING AND SHARING

Table 2. Assessment Form

QUESTION	OPTIONS (IF APPLICABLE)	EA SCORE (IF APPLICABLE)
1 Has it rained in the last 48 hours in the survey area?	a) Yes (If yes, please do not complete the survey until there has been 48 hours of no rain) b) No	
2 Surveyor		
3 Date and time of survey		
4 Activity	a) Mark start of survey b) Outfall Assessment c) Mark end of survey d) Inaccessible area	
5 Describe the nearest landmark		
6 GPS location		
7 Outfall reference number		
8 Select the surveyed bank as seen when looking downstream	a) Left b) Right	
9 Rank the flow coming out of the outfall	a) No flow b) Trickle c) Low flow d) Moderate flow e) High flow	
10 What is the downstream visual impact of the outfall?	a) No visible effect b) Within 2m of outfall c) Impact 2m to 10m from outfall d) Impact 10m to 30m from outfall e) Impact greater than 30m from outfall	a) 0 b) 2 c) 4 d) 6 e) 10
11 What is the condition of discharge from the outfall?	a) No odour or visible aesthetics b) Faint smell, slight discolouration c) Mild smell, mild discolouration, small coverage of sewage fungus d) Strong smell, strong discolouration, large coverage of sewage fungus and/or litter e) Gross smell, gross sewage	a) 0 b) 2 c) 4 d) 6 e) 10
12 List any other forms of pollution at the outfall		
13 Photographs of outfalls		
14 Did you report this pollution event to the water company	a) Yes b) No	
15 If yes, what was the incident case number provided by the water company?		

Table 3. Tips for completing the assessment form

QUESTION	GUIDANCE
Has it rained in the last 48 hours in the survey area?	In order to produce good, standardised data, it is important that outfalls are surveyed under the same weather conditions to ensure that pollution is visible and has not been washed away by rain. It takes around 48 hours for sewage fungus to reappear, so we advise that no surveys are undertaken unless there has been dry weather for at least this time. This is added to the survey form to remind volunteers of this rule to make sure we are collecting comparable data both within catchments and nationally.
Surveyor	It is important that volunteers include their names so that if the host NGO has any queries whilst processing the data, they know who they should contact.
Date and time of survey	
Activity	Volunteers should stand as close as (safely) possible to the outfall when recording the GPS location. Occasionally there can be issues with the accuracy of the GPS, which is why it is good to emphasise the importance of including other location details in the assessment form.
Describe the nearest landmark	It is helpful to include a postcode and be as descriptive as possible of the nearest landmark – what is the nearest road or identifiable building to the outfall, how many other outfalls can be seen from this location, is the surveyor standing on the same bank as the outfall, etc. If the surveyor is near a residential area, the nearest house number is also useful. The more location detail that is provided, the easier it is for follow up action to be taken on a PSWO.
GPS location	Cartographer allows volunteers to locate the outfall on an interactive map where they can pin their exact location.
Outfall reference number	In the Thames region, before the Outfall Safari season begins, Thames Water provide a unique reference code for each outfall (e.g. SURB0039). During the survey, volunteers are asked to check if they are surveying a previously mapped outfall, and if so, list its reference number. This allows us to more easily track the behaviour of individual outfalls across different years.
Select the surveyed bank as seen when looking downstream	This should be left or right as the surveyor stands looking downstream.
Ranking of the flow coming out of the outfall	The categories for this section are quite subjective therefore use photographs as a guide (see examples below), as well as these approximations: • Trickle: <0.1l/s or enough to fill a teacup in a minute • Low flow: between 0.1l/s and 1.0l/s or enough to fill a bucket in a minute • Moderate flow: 1.0l/s to 2.0l/s or more than a bucket full each minute • High flow: clearly >2.0l/s or more than a bathtub in a minute Volunteers should still assess outfalls with no flow.
Q9 &10 What is the downstream visual impact and the condition of discharge from the outfall?	Question 8 is about how far from the outfall that signs of pollution can be seen. Signs of pollution include: • Grey fungus (grey, tufty growth on the riverbed) • Foam or scum on the surface of the river • Plume of discoloured water • Sewage related debris, such as sanitary products ('rag') See photographs below. There might not be a perfect fit, but select the category that most closely matches what is there.
Other signs of pollution	This section is free text and can be used to describe pollution that is not covered by earlier questions. If other forms of pollution are seen, volunteers should include information such as what is the colour of the water, is oil or fat present and if so, what colour is the fat, is food waste present, are silt/construction materials present, etc. If other forms of debris (not necessarily sewage debris) have collected at an outfall grate and so are clogged (or becoming clogged), then this can be noted in this section too. Clearance of this debris should be actioned by the water company.
Photographs of outfalls	Clear photos of the outfall and associated impact help with processing and quality control of the data. Ensure photos do not include peoples faces or car registration numbers.
Did you report this pollution event to the water company? If yes, what was the case number?	Every time a pollution incident is logged with a water company (either online or over the phone), they will provide a case number, which is a code that is unique to the pollution incident that you reported. Upon reporting severely polluting outfalls during surveys, volunteers should relay this case number to the host NGO so that the progress of these outfalls can be tracked.

DATA CAPTURE, PROCESSING AND SHARING

Include examples like the images below in your volunteer training material

Flow coming out of the outfall

Extent of visual impact of outfall


visible foam/ scum on the surface of the river


sewage-related debris or 'rag'


plumes of discoloured water


sewage fungus

DATA CAPTURE, PROCESSING AND SHARING

Include examples like the images below in your volunteer training material

Other forms of pollution

NON-SEWAGE RELATED POLLUTION SUCH AS OIL SHOULD BE RECORDED SEPARATELY FOR FURTHER INVESTIGATION BY THE REGULATOR

Conversion of outfall assessments to impact scores

To assist with prioritisation of the PSWOs, the Environment Agency provided a method of converting the assessment data to a numeric impact score for each outfall. These scores are shown under impact score (if applicable) in Table 1. The scores for extent of the downstream visual impact of the outfall and the score for aesthetics of the outfall are combined to a single total impact score. Therefore, the maximum impact score that an outfall can be assessed as is 20 (i.e. the most polluted).

The approach taken for Greater London (in agreement with Thames Water and the Environment Agency) assumes that outfalls that score 0 are not polluted and those that score 1-3 show minimal signs of pollution. It is also assumed, with reasonable confidence, that any outfall that scores 4 or higher is a pollution issue. All outfalls that are assessed (including those that score 0) should be contained within the database of results and the total number of outfalls assessed stated in the survey report. The location (coordinates), water company reference number (if present), national grid reference, bank side (left or right), outfall score and photo for all outfalls that score 4 or more (outfalls that are considered a pollution problem) should be summarised in a table in the survey report. These outfalls are earmarked for further investigation by the water company and the regulator.
For those outfalls that score 10 or higher, a specific reporting procedure is in place with the Environment Agency and Thames Water, which is explained on page 20.

The thresholds and reporting procedure can be adapted to suit local requirements. As part of the early involvement of the regulator and the water company, the approach to reporting should be agreed – whether the approach for Greater London is adopted or whether this needs to be adapted to suit the local scenario. Ideally, outfalls showing any signs of pollution (i.e. scores more than 0) would be investigated, however, those thresholds should be decided jointly with the water company and regulator and will likely depend on resource availability for further investigation.

DATA CAPTURE, PROCESSING AND SHARING

Reporting procedure for impact scores of 10 or higher

Outfalls that score **10 or higher** suggest a serious pollution problem that requires the immediate attention of the water company, who should be notified of the pollution incident at the time of finding it (i.e. from the river).

It is water company's responsibility to report the incident to the regulator. The regulator should only be contacted directly by a volunteer when a major incident is occurring, i.e., where an outfall is scoring **10 or higher** and there are signs of dead or struggling fish.

Each water company will have a different phone number to report in pollution. For Thames Water:

- call **0800 316 9800**; or
- use their **online reporting tool**, found here: thameswater.co.uk/help/report-a-problem

To report the incident to the regulator in England, Scotland or Northern Ireland:

- call: **0800 807 06** (the Environment Agency, Scottish Environmental Protection Agency (SEPA) and Northern Ireland Environment Agency (NIEA) all share the same number)

The information required will vary depending on the location and organisations involved, but generally the volunteer should provide the following information when reporting pollution from the river:

- The **GPS** location. Providing a **W3W** location can also be helpful in narrowing down the location if you have it.
- The bank that the outfall is on (left or right, looking downstream).
- A description of the visual extent and condition of the pollution.

The water company will provide a reference number, and this should be recorded as part of the survey form so that it can be included in the survey report to the water company.

To assist volunteers and avoid missing outfalls that exceed the 'reporting from the river threshold', Cartographer has integrated the scoring function into the project app so that the total score is displayed once the volunteer has completed the survey form and volunteers are promoted to report the incident if the score entered was over 10. However, as the highest scoring polluted outfalls, these have the greatest potential to cause damage to the ecology of the river. It is recommended that during training the importance of this reporting procedure is emphasized.

EXAMPLES OF OUTFALLS SCORING OVER 10

QUICK GUIDE TO THE OUTFALL SAFARI METHOD ADOPTED IN GREATER LONDON

SERIOUS POLLUTION INCIDENTS MUST BE REPORTED FROM THE RIVER FOR IMMEDIATE ATTENTION

Downstream visual impact of outfall

- No visible impact **score 0**
- Impact 0m-2m **score 2**
- Impact 2m-10m **score 4**
- Impact 10m-30m **score 6**
- Impact 30m+ **score 10**

+

Aesthetics at outfall

- No odour or visible aesthetics **score 0**
- Faint smell, slight discolouration **score 2**
- Mild smell, mild discolouration, small coverage of sewage fungus **score 4**
- Strong smell, strong discolouration, visible foam/scum, large coverage of sewage fungus and/or litter **score 6**
- Gross smell, gross sewage **score 10**

Total outfall impact score **GREATER THAN 10**

'A GREATER THAN 10M IMPACT ZONE' AND 'STRONG SMELL, STRONG DISCOLOURATION, LARGE COVERAGE OF SEWAGE FUNGUS AND/OR LITTER' REQUIRES URGENT ATTENTION

NO

YES

Total outfall impact **SCORE 4-9**

Volunteers immediately report to water company and Environment Agency for urgent attention.

YES

NO

Include the details (location, national grid reference, bank side, outfall score and photo) of any outfall that scores ≥4 in the survey report. Share survey report with the water company, the regulator, the catchment partnership as well as volunteers. Outfalls should be investigated further and sources of pollution removed.

No further investigation required at this stage. Include in total number of outfalls assessed within report and in full outfall database, which can be made available to the water company, the regulator and catchment partnerships.

DATA CAPTURE, PROCESSING AND SHARING

Collecting data with **Cartographer**

Creating an account

Volunteers can download **Cartographer** for free from the Apple App Store and Google Play. If your organisation would like to start an Outfall Safari and get set up as a team coordinator, please contact the national project coordinators, ZSL, at marineandfreshwater@zsl.org.

Download on the App Store

GET IT ON Google Play

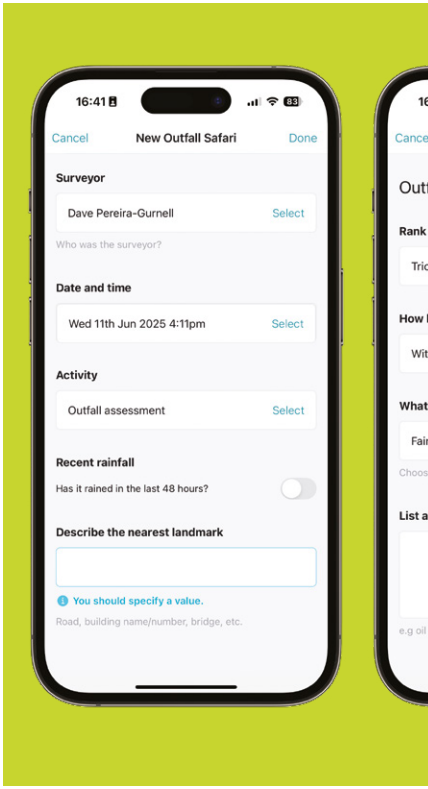
Once volunteers have attended a training session, they can be sent the link to set up a **Cartographer** account via the team coordinator (The NGO running the Outfall Safari in your area).

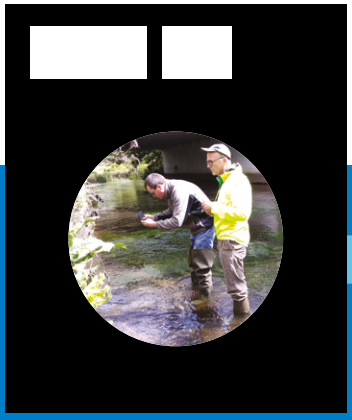
In the Thames region, Thames Water have supplied the locations of all their known outfalls, which have been added to the Cartographer map. If the water company in your region would like to add their known outfalls to the map, please get in touch with ZSL. Being able to identify the unique reference numbers of outfalls will allow us to build up a national database on the behaviour of individual outfalls and better track pollution history and rectification.

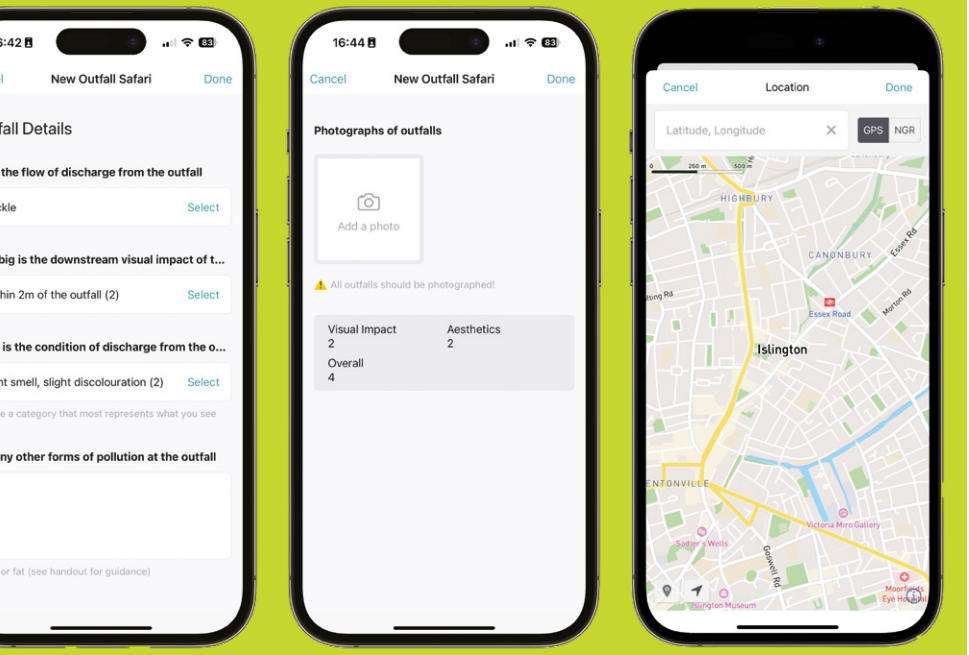
cartographer

THE OUTFALL SAFARI FORM

The basic Outfall Safari Form looks like this on a mobile phone:






New Outfall Safari
Done
Details
the flow of discharge from the outfall
Select
Select
is the condition of discharge from the o...
Select
Cancel
New Outfall Safari
Done
Photographs of outfalls
Add a photo
All outfalls should be photographed!
Visual Impact
2
Aesthetics
2
Overall
4
Cancel
Location
Done
Latitude, Longitude
GPS
NGR
HIGHBURY
CANONBURY
Essex Road
Islington
Victoria Miro Gallery
Sadler's Wells

MAKING IMPACT

Key partners for an Outfall Safari project

For Outfall Safari projects to be successful in tracing and removing pollution sources, they must consult and collaborate with the key partners; the water company, regulator and Catchment Partnership. The regulator and water company play a role in training volunteers and are responsible for resolving PSWOs. In cases where local adaptations need to be made to the form, prior participation should be agreed with all partners.

However, if active water company participation is not possible, gathering evidence on the location and extent of the problem of polluting surface water outfalls is still important. Evidencing the scale of the PSWO issue at catchment and national scale will support debate on the management practices; policy, and legislation around urban diffuse pollution.

In Greater London, the water company, Thames Water, are responsible for most outfalls, the rest are owned privately or are the responsibility of the Highways Agency or local authority.

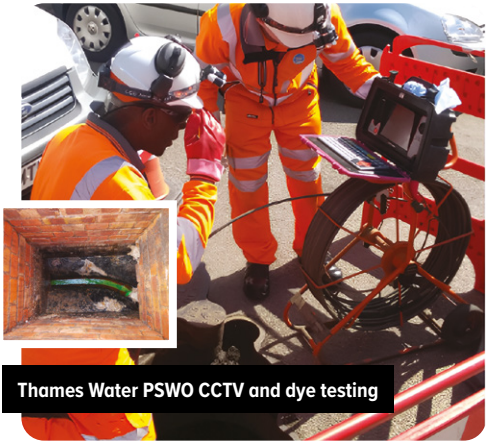
Thames Water has a process in place for PSWOs identified through Outfall Safaris

When a PSWO is reported to Thames Water, their Network Resolution or Local Operations teams work to trace the source of the pollution. The aim of the Network Resolution Team is to investigate polluted outfalls as soon as possible. They determine if the outfall's catchment has a network fault such as a blockage, broken sewer or other pollution sources, or whether the pollution is caused by widespread misconnections, which would require a strategic long-term investigation through the Surface Water Outfall Programme (SWOP). This process has been developed with the regulator to resolve polluted outfalls that suffer from widespread diffuse pollution sources. The volume of work your water company can do to remove pollution from outfalls is, however, limited by the budget allocated to the problem.

When a misconnection is found, a letter is sent by Thames Water to the property owner. In 2024, the voluntary rectification rate – the proportion of priority owners who correct the misconnection after receiving a letter – in the Thames region was 77%, but in previous years this has been as high as 90%. If the issue is not rectified voluntarily after a letter, legislation gives powers of enforcement to local authorities and Thames Water to enforce rectification.

Environment Agency staff were instrumental in developing the Outfall Safari methodology and regularly support in-channel survey work in London. They decide with the water company, which outfalls go on the SWOP list and are responsible for investigating pollution not related to misconnections, like illegal discharges of chemicals. Working with the regulatory team in the local area helps them understand what they require from the Outfall Safari, like reporting requirements.

The Catchment Coordinators, the first point of contact, engage the Environment Management Land and Water teams, who lead on water pollution regulations; and Watercourse Inspectors for information regarding access, particularly for in-channel surveys.



Thames Water PSWO CCTV and dye testing

ZSL'S 2024 REVIEW OF OUTFALL SCORING

The outfall assessment and scoring method used in outfall Safari was adapted from the Water UK and the Environment Agency's '*Good Practice Document on Investigation and rectification of drainage misconnections*' (2009).

With help from the Environment Agency, the scoring system was checked to see if it is effective in detecting polluting outfalls based on their visible signs of pollution. Water chemistry was analysed directly from flowing outfalls or directly downstream of them, to compare these results with the visual scoring method used in Outfall Safari. Water chemistry data was collected from 38 outfalls over the course of three in-channel surveys.

All water samples were collected in a stainless-steel bucket, and a YSI multiparameter water quality meter used to measure the following:

- Temperature (°C);
- Dissolved Oxygen (% saturation);
- Conductivity (uS/cm);
- pH;
- Ammonium NH4+ (mg/l); and
- Ammonia NH3 (mg/l).

Outfalls were scored using the Outfall Safari method at the same time as taking water samples. During the analysis, the dissolved oxygen, ammonium NH4 were classified according to the Water Framework Directive (WFD) thresholds, to characterise the water quality within each outfall score.

Results

Dissolved Oxygen

Average levels of dissolved oxygen showed a general trend of decreasing with increasing outfall scores. However, there existed a large variation of dissolved oxygen levels within each outfall score, and large amounts of overlap of dissolved oxygen levels between different outfall scores.

Ammonium NH4+ (mg/l)

General trend showed that the number of outfalls that's scored "poor" for NH4 concentration, increased with increasing outfall score, while the opposite trend of decreasing number of outfalls scoring "good" and "moderate" with increasing outfall score. Increasing amount of variation in ammonium scores were seen with increasing outfall score.

Conductivity (uS/cm)

Large amounts of variation were seen in the conductivity measurements across outfalls scores, with the lowest mean conductivity seen for outfall score 0 and highest for outfall score 10. The general trend showed that the number of outfalls that's scored "low" and "moderate" for conductivity water quality, decreased with increasing outfall score. The number of outfalls that scored "high" remained relatively consistent across all outfall scores.

Conclusions:

Although variation exists, the general trends showed that with increasing outfalls scores, dissolved oxygen decreased, ammonium NH4 increased, and conductivity was highest at outfalls scored 10 and lowest at outfalls score 0. This suggests that the outfall safari method is effective in detecting and reporting polluting outfalls through the current visual scoring method.

To receive a full copy of this review, please contact ZSL at marineandfreshwater@zsl.org.

LONDON CASE STUDY

ZSL has been running a systematic Outfall Safari programme in London since 2016. This work has been funded by Thames Water since 2018. Every river in London is surveyed on a four-year rotation.

In total, 23% of assessed outfalls have shown some sign of visible pollution (scores 4+). Outfalls that are deemed highly polluting (scores ≥10) account for 4% of outfalls found. On average we have found 1 PSWO scoring ≥6 per km of river surveyed in London. The Thames Water Surface Water Outfall Programme (SWOP) team were established to remove misconnections from their network (see results below). They follow up on reports of PSWOs from members of the public which largely now come from Outfall Safaris. The SWOP results have highlighted that it is not just misconnected pipework that causes PSWOs, but also blockages, private and public defects (see results opposite).

GREATER LONDON OUTFALL SAFARI PROGRAMME IN NUMBERS:

SINCE 2016

+671KM
of river surveyed

490
volunteers engaged

4465
outfall assessments conducted

638
polluting outfalls (≥6) identified

162
highly polluting (≥10) outfalls identified

RESULTS OF SWOP ACTION FROM 2020-2025

194
Outfalls significantly improved so far and signed off by Environment Agency (minimum AMP target 200)

3,403
Properties with misconnections/defects – 18.8% rate per property surveys (after narrowing down network)

7,385
Individual misconnected appliances

18,915
Properties surveyed

48,432
Total visit attempts

SWOP RESULTS FROM 2020-2025

1,314

Defects found additionally to physical misconnected pipework, which are also a potential pollution source: Properties where there are misconnected appliances, but in addition to these misconnections there may be some additional defect, for example a crack in the benching of a sewer pipe or a missing gulley divider.

269

Public defects: These relate to any defect that is identified and is Thames Waters responsibility to rectify as it has occurred to the part of the drainage system that we are responsible for. As with private defects, it can relate to a very wide variety of different issues.

291

Private blockages: These are blockages that specifically occur in a customer's private drainage system, before they reach our sewers. Many times, the blockage can result in sewage overflowing and entering the surface water systems, resulting in pollution to the local watercourse (after narrowing down network).

102

Private defects: This is a very broad category of defect that encompasses any type of defect except those not defined elsewhere, for example it does not include blockages, missing surface water caps, damages or missing gulley dividers or any housekeeping issues where customers are tipping waste down the wrong drain. Anything else would likely be included in this designation which covers a vast array of not so common and potentially unique defects. The one thing that they have in common is that the issue relates to a customer's private drainage.

500

Private surface water caps missing: These are properties where a surface water caps that are part of a customer private drainage are missing; this can cause sewage to enter the open cap and be discharge to the local watercourse. In these cases, TW offer to replace the cap for free to the customer but require their permission to do so as it is part of their private drainage system.

FURTHER READING

Ellis, J., Butler, D. (2015). Surface water sewer misconnections in England and Wales: Pollution sources and impacts. Science of the Total Environment 1(526):98-109. Available at: 10.1016/j.scitotenv.2015.04.042

Water UK., Environment Agency. (2009). Investigation and rectification of drainage misconnections. Good Practice Document. Available at: https://www.connectright.org.uk/files/media/6021873d9b16e04cec65249d019b18ee50ae2d8d/water%20uk%20ea%20good%20management%20practice%20-%20misconnections%20version1%201_2%202009.pdf

Water UK (2025). Misconnections pollute rivers and beaches throughout the UK. Available at: https://www.water.org.uk/developers/plumbing-and-drainage-misconnections

ZSL (2025). London's Rivers. Available at: https://www.zsl.org/what-we-do/projects/londons-rivers

CaSTCo (2025). Putting people at the heart of river recovery. Available at: https://castco.org/